

SEQUENCE LISTING

<110> Kovacs, et al.

<120> Identification of a region of the major surface
glycoprotein (MSG) gene of human *Pneumocystis carinii*

<130> 4239-66050

<150> 09/762,724

<151> 2001-09-02

<150> PCT/US99/18750

<151> 1999-08-17

<150> US 60/096,805

<151> 1998-08-17

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<170> PatentIn Ver. 2.0

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<212> DNA

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agt gaa gca aat cta act cca gaa caa gta cat gaa aag tta aaa gat	192
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 Met Tyr Leu Lys Glu Lys Cys Asn Glu Trp Ser Arg Arg Arg Asn Glu
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Glu His Ile Ile Leu Lys Asp Leu Cys Ser Asn Lys Thr Ile Thr Asp	
340 345 350	
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Asn Pro Lys Glu Lys Cys Glu Glu Leu Asn Lys Glu Leu Thr Thr Arg	
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Ile Leu Thr Val Ser Lys Arg Ile Glu Lys Tyr Phe Ala Pro Ala Asn	
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Val Lys Glu Ile Ile Gly Trp His Met Leu His Thr Phe Leu Gly Glu	
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Arg Glu Cys Thr Lys Leu Leu Ser Asp Cys Phe Tyr Leu Lys Ser Gln	
405 410 415	

gct cca ctt gaa aag ccc tgc aat aac tta aaa gca gca tgt tat aaa	1296
Ala Pro Leu Glu Lys Pro Cys Asn Asn Leu Lys Ala Ala Cys Tyr Lys	
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Lys Gly Leu Glu Ala Val Ala Asn Glu Ala Leu Gln Asp Lys Leu Arg	
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gga aaa ttg caa ggt tca aat aga aca tgg ctt gaa acc ctt caa aaa	1392
Gly Lys Leu Gln Gly Ser Asn Arg Thr Trp Leu Glu Thr Leu Gln Lys	
450 455 460	
aac ttg gta aaa gtt tgt gaa aag acg aaa gga gaa agt gat gaa tta	1440
Asn Leu Val Lys Val Cys Glu Lys Thr Lys Gly Glu Ser Asp Glu Leu	
465 470 475 480	
ttt gta cta tgt atg aac cca ata aaa acg gct ctt aca gtg tca aca	1488
Phe Val Leu Cys Met Asn Pro Ile Lys Thr Ala Leu Thr Val Ser Thr	
485 490 495	
gat ttg cga atg agg gca gtt gct ttg caa gag cat ttg aac gaa aaa	1536
Asp Leu Arg Met Arg Ala Val Ala Leu Gln Glu His Leu Asn Glu Lys	
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Arg Asp Phe Pro Thr Glu Lys Asp Cys Lys Glu Leu Glu Lys Lys Cys	
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Glu Val Leu Gly Lys Asp Ser Arg Glu Ile Lys Trp Ser Cys Tyr Thr	
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Leu Lys Gln His Cys Asn Arg Leu Lys Ser Ile Glu His Leu Glu Glu	
545 550 555 560	
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Glu Leu Leu Lys Glu Asn Lys Gly Tyr Leu Lys Asp Glu Asn Ser Cys	
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Lys Glu Glu Ala Lys Lys Arg Cys Glu Lys Trp Phe Arg Arg Glu Asn	
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Asn Lys Phe Phe Ser Ala Cys Ser Asp Leu Glu Leu Val Cys Lys Lys	
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atc act aga aat gtt gaa tct aaa tgt aat ata ttg aaa gga cat atg	1872
Ile Thr Arg Asn Val Glu Ser Lys Cys Asn Ile Leu Lys Gly His Met	
610 615 620	
gaa act atg aac gtt ata agt gaa ata gct aaa aaa gag gaa aaa ata	1920
Glu Thr Met Asn Val Ile Ser Glu Ile Ala Lys Lys Glu Glu Lys Ile	
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Cys Glu Phe Trp Ala Pro Tyr Cys Lys Lys Tyr Glu Gln Asn Cys Glu	
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Lys Cys Lys Ser Phe Leu Glu Lys Glu Ala Leu Glu Asn Lys Val Val	
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Thr Leu Cys Lys Ser Lys Glu Asn Thr Lys Ser Asp Ile Lys Val Arg	
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Asn Lys Ser Val Asn Lys Asp Ser Ser Asp Thr Pro Lys Glu Gly Lys	
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Gly Thr Thr Gly Phe Lys Leu Val Arg Arg Asn Ala Lys Val His Val	
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Thr Glu Lys Glu Leu Ala Ala Phe Asp Leu Val Ala Arg Ala Phe Asp	
835 840 845	
ctc tat cta gaa ttg aaa gaa ata tgt aat cat tca ctg aag aat tgt	2592
Leu Tyr Leu Glu Leu Lys Glu Ile Cys Asn His Ser Leu Lys Asn Cys	
850 855 860	
ggt ttc aaa aaa gag tgt gac tgt gag gat cca tgt aaa aag ata cag	2640
Gly Phe Lys Lys Glu Cys Asp Cys Glu Asp Pro Cys Lys Lys Ile Gln	
865 870 875 880	
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Gly Ile Cys Ser Thr Leu Glu Pro Leu Lys Val Arg Pro His Glu Ile	
885 890 895	

gta act aaa aac ata aca act aca acc aca acc acc acc aca act acc 2736
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 Ile Lys Asp Ala Lys Ala Thr Asp Cys His Ser Leu Gln Thr Thr Asp
 915 920 925

acg tgg gtc aca aag acg tcg acc cat act agc aca tcc aca acc aca 2832
 Thr Trp Val Thr Lys Thr Thr Thr His Thr Ser Thr Ser Thr Thr Thr Thr
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tct aca gtc acg tca aga ata acg ttg acc tcg aca aga cgg tgt aag 2880
 Ser Thr Val Thr Ser Arg Ile Thr Leu Thr Ser Thr Arg Arg Cys Lys
 945 950 955 960

cct acg aag tgt acg aca gga gag gaa gat gaa gca gga gac gtg aaa 2928
 Pro Thr Lys Cys Thr Thr Gly Glu Glu Asp Glu Ala Gly Asp Val Lys
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Val Thr Lys Glu Pro Lys Lys Leu Glu Glu Lys Leu Asp Gly Ile Cys
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Lys Cys Asn Glu Leu Arg Asn Lys Cys Tyr Gln Lys Lys Arg Asp Asp
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Lys	Asn	Thr	Cys	Lys	Asn	Lys	Leu	Lys	Gly	Val	Cys	Gln	Glu	Phe	Asn	165	170		175
Lys	Glu	Ser	Asp	Glu	Leu	Ile	Lys	Leu	Cys	Leu	Asp	Glu	Glu	Lys	Thr	180	185		190
Cys	Gly	Asp	Leu	Val	Ser	Lys	Lys	Glu	Tyr	Lys	Cys	Lys	Pro	Leu	Lys	195	200		205
Glu	Gly	Ile	Asp	Leu	Val	Leu	Gly	Lys	Glu	Asp	Leu	Leu	Lys	Glu	Lys	210	215		220
Cys	Leu	Leu	Phe	Leu	Glu	Glu	Cys	Tyr	Phe	Tyr	Gly	Ser	Asn	Cys	Glu	225	230		235
Thr	Asp	Gln	Pro	Lys	Cys	Lys	Glu	Phe	Ala	Ser	Lys	Cys	Gln	Lys	Glu	245	250		255
Asn	Leu	Val	Tyr	Ala	Ala	Pro	Gly	Ser	His	Phe	Asp	Pro	Thr	Lys	Leu	260	265		270
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Ala	Val	Lys	Lys	Gly	Ile	His	Ile	Gly	Arg	Pro	Ser	Ile	Lys	Asp	Glu	290	295		300
Val	Ala	Leu	Leu	Ala	Leu	Leu	Ser	Lys	Ser	Asp	Ala	Gln	Asn	Thr	Phe	305	310		315
Lys	Asp	Gln	Cys	Glu	Asp	Val	Ile	Lys	Lys	Lys	Cys	Gly	Asn	Phe	Lys	325	330		335
Glu	His	Ile	Ile	Leu	Lys	Asp	Leu	Cys	Ser	Asn	Lys	Thr	Ile	Thr	Asp	340	345		350
Asn	Pro	Lys	Glu	Lys	Cys	Glu	Glu	Leu	Asn	Lys	Glu	Leu	Thr	Thr	Arg	355	360		365
Ile	Leu	Thr	Val	Ser	Lys	Arg	Ile	Glu	Lys	Tyr	Phe	Ala	Pro	Ala	Asn	370	375		380
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Arg	Glu	Cys	Thr	Lys	Leu	Leu	Ser	Asp	Cys	Phe	Tyr	Leu	Lys	Ser	Gln	405	410		415
Ala	Pro	Leu	Glu	Lys	Pro	Cys	Asn	Asn	Leu	Lys	Ala	Ala	Cys	Tyr	Lys	420	425		430
Lys	Gly	Leu	Glu	Ala	Val	Ala	Asn	Glu	Ala	Leu	Gln	Asp	Lys	Leu	Arg	435	440		445
Gly	Lys	Leu	Gln	Gly	Ser	Asn	Arg	Thr	Trp	Leu	Glu	Thr	Leu	Gln	Lys	450	455		460

Asn	Leu	Val	Lys	Val	Cys	Glu	Lys	Thr	Lys	Gly	Glu	Ser	Asp	Glu	Leu	465	470	475	480
Phe	Val	Leu	Cys	Met	Asn	Pro	Ile	Lys	Thr	Ala	Leu	Thr	Val	Ser	Thr		485	490	495
Asp	Leu	Arg	Met	Arg	Ala	Val	Ala	Leu	Gln	Glu	His	Leu	Asn	Glu	Lys	500		505	510
Arg	Asp	Phe	Pro	Thr	Glu	Lys	Asp	Cys	Lys	Glu	Leu	Glu	Lys	Lys	Cys	515	520	525	
Glu	Val	Leu	Gly	Lys	Asp	Ser	Arg	Glu	Ile	Lys	Trp	Ser	Cys	Tyr	Thr	530	535	540	
Leu	Lys	Gln	His	Cys	Asn	Arg	Leu	Lys	Ser	Ile	Glu	His	Leu	Glu	Glu	545	550	555	560
Glu	Leu	Leu	Lys	Glu	Asn	Lys	Gly	Tyr	Leu	Lys	Asp	Glu	Asn	Ser	Cys	565	570		575
Lys	Glu	Glu	Ala	Lys	Lys	Arg	Cys	Glu	Lys	Trp	Phe	Arg	Arg	Glu	Asn	580	585		590
Asn	Lys	Phe	Phe	Ser	Ala	Cys	Ser	Asp	Leu	Glu	Leu	Val	Cys	Lys	Lys	595	600		605
Ile	Thr	Arg	Asn	Val	Glu	Ser	Lys	Cys	Asn	Ile	Leu	Lys	Gly	His	Met	610	615	620	
Glu	Thr	Met	Asn	Val	Ile	Ser	Glu	Ile	Ala	Lys	Lys	Glu	Glu	Lys	Ile	625	630	635	640
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Lys	Leu	Lys	Asn	Gly	Gly	Lys	Asp	Gly	Gln	Cys	Lys	Lys	Leu	Asn	Lys	660	665		670
Lys	Cys	Lys	Ser	Phe	Leu	Glu	Lys	Glu	Ala	Leu	Glu	Asn	Lys	Val	Val	675	680		685
Glu	Glu	Leu	Lys	Gly	Ser	Leu	Ser	Asn	Val	Gly	Glu	Cys	Asn	Asn	Thr	690	695	700	
Leu	Asn	Ile	Tyr	Cys	Thr	Gln	Leu	Lys	Lys	Ala	Glu	Asn	Gly	Leu	Glu	705	710	715	720
Thr	Leu	Cys	Lys	Ser	Lys	Glu	Asn	Thr	Lys	Ser	Asp	Ile	Lys	Val	Arg	725	730		735
Glu	Glu	Leu	Cys	Glu	Lys	Leu	Ile	Lys	Arg	Ile	Lys	Glu	Lys	Cys	Ser	740	745		750
Lys	Leu	Lys	Asp	Glu	Leu	Glu	Glu	Val	Lys	Glu	Val	Leu	Glu	Lys	Lys	755	760		765
Glu	Glu	Lys	Tyr	Lys	Lys	Ile	Lys	Glu	Glu	Ala	Glu	Lys	Ala	Met	Glu	770	775	780	

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 Gly Thr Thr Gly Phe Lys Leu Val Arg Arg Asn Ala Lys Val His Val
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 Gly Phe Lys Lys Glu Cys Asp Cys Glu Asp Pro Cys Lys Lys Ile Gln
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 Gly Ile Cys Ser Thr Leu Glu Pro Leu Lys Val Arg Pro His Glu Ile
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 Val Thr Lys Asn Ile Thr Thr Thr Thr Thr Thr Thr Thr Thr Thr
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 Ile Lys Asp Ala Lys Ala Thr Asp Cys His Ser Leu Gln Thr Thr Asp
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 Thr Trp Val Thr Lys Thr Ser Thr His Thr Ser Thr Ser Thr Thr Thr
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 Pro Thr Lys Cys Thr Thr Gly Glu Glu Asp Glu Ala Gly Asp Val Lys
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 Asp Glu Glu His Val Leu Ala Leu Ile Leu Lys Lys Asn Gly Leu Glu
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Val	Asn	Gln	Lys	Cys	Ile	Lys	Phe	Gln	Gly	Lys	Leu	Gln	Thr	Ala	Ala	
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Gly	Lys	Lys	Ile	Ser	Glu	Leu	Thr	Asp	Glu	Asp	Cys	Lys	Lys	Asn	Glu	
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Gln	Gln	Cys	Leu	Phe	Leu	Glu	Gly	Ala	Cys	Pro	Thr	Glu	Leu	Lys	Asp	
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gac	tgc	aat	aaa	tta	agg	aat	aac	tgt	tat	caa	aaa	gaa	cgg	aac	aat	432
Asp	Cys	Asn	Lys	Leu	Arg	Asn	Asn	Cys	Tyr	Gln	Lys	Glu	Arg	Asn	Asn	
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Thr	Lys	Thr	Cys	Glu	Lys	Lys	Leu	Lys	Glu	Val	Cys	Pro	Lys	Leu	Glu	
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Arg	Glu	Ser	Asp	Glu	Leu	Thr	Glu	Leu	Cys	Leu	Tyr	Gln	Lys	Thr	Thr	
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Cys	Val	Ser	Leu	Val	Thr	Lys	Gly	Lys	Ser	Lys	Cys	Asp	Thr	Leu	Glu	
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Lys	Glu	Val	Glu	Glu	Ala	Leu	Lys	Lys	Asn	Glu	Leu	Arg	Glu	Lys	Cys	
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Leu	Leu	Leu	Leu	Glu	Gln	Cys	Tyr	Phe	His	Arg	Gly	Asn	Cys	Glu	Gly	
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Asp	Lys	Ser	Lys	Cys	Asn	Lys	Pro	Asn	Asn	Lys	Asp	Cys	Lys	Glu	Tyr	
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Val	Pro	Glu	Cys	Asp	Glu	Leu	Ala	Glu	Lys	Cys	Gly	Lys	Glu	Asn	Ile	
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Cys Asp Glu Leu Glu Lys Asp Val Asn Lys Thr Cys Thr Ser Leu Thr	
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Ser Thr Ile Leu Lys Asn Arg Leu Tyr Ile Ser Pro Asp Gly Ile Ala	
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Leu Glu Ser Tyr Cys Phe Tyr Tyr Lys Glu Thr Cys Pro Asp Val Lys	
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Glu Ala Cys Met Asn Val Arg Ala Ala Cys Tyr Lys Arg Gly Leu Asp	
435 440 445	
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Ala Arg Ala Asn Ser Val Leu Gln Lys Asn Met Arg Gly Leu Leu His	
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Gly Ser Asn Lys Asp Trp Leu Lys Lys Phe Gln Gln Glu Leu Ala Lys	
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Val Cys Glu Lys Leu Lys Gly Asn Lys Gly Ser Phe Ser Asn Asp Glu	
485 490 495	
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Leu Phe Val Leu Cys Ile Gln Pro Ala Lys Ala Ala Arg Leu Leu Thr	
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Lys	Arg	Asp	Phe	Pro	Thr	Asp	Lys	Asp	Cys	Lys	Glu	Leu	Gly	Arg	Lys	
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tgc	caa	gat	tta	gga	aag	gat	tca	aaa	gaa	att	aca	tgg	cca	tgt	cat	1680
Cys	Gln	Asp	Leu	Gly	Lys	Asp	Ser	Lys	Glu	Ile	Thr	Trp	Pro	Cys	His	
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Thr	Leu	Glu	Gln	Gln	Cys	Asn	Arg	Leu	Gly	Ile	Thr	Glu	Ile	Leu	Lys	
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cag	att	tta	ttg	gat	gaa	cac	aaa	gat	act	ttg	aaa	agt	cat	gaa	aac	1776
Gln	Ile	Leu	Leu	Asp	Glu	His	Lys	Asp	Thr	Leu	Lys	Ser	His	Glu	Asn	
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Cys	Ala	Lys	Tyr	Leu	Lys	Arg	Lys	Cys	His	Lys	Trp	Ser	Arg	Arg	Gly	
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Asp	Asp	Arg	Phe	Ser	Phe	Val	Cys	Val	Phe	Gln	Asn	Ala	Thr	Cys	Glu	
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Arg	Phe	Leu	Pro	Asn	Cys	Pro	Asp	Leu	Lys	Lys	Gly	Lys	Thr	Phe	Cys	
		675					680					685				
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Gln	Asn	Leu	Lys	Lys	Tyr	Cys	Glu	Pro	Phe	Tyr	Lys	Arg	Lys	Val	Leu	
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Lys	Cys	Glu	Pro	Ala	Leu	Glu	Arg	Tyr	Cys	Thr	Val	Leu	Lys	Asp	Val	
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Asn	Asn	Ala	Ser	Ile	Ser	Ser	Leu	Cys	Lys	Asp	Asn	Thr	Glu	Ser	Lys	
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Leu	Val	Glu	Glu	Val	Glu	Gln	Gln	Cys	Lys	Val	Leu	Pro	Thr	Glu	Leu	
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Thr	Glu	Leu	Glu	Lys	Ser	Leu	Lys	Lys	Asp	Val	Lys	Thr	Tyr	Glu	Glu	
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Leu	Lys	Glu	Arg	Ala	Lys	Lys	Ala	Met	Asn	Lys	Ser	Ser	Leu	Val	Leu	
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Ser	Leu	Val	Lys	Lys	Asn	Glu	Ser	Asn	Thr	Ser	Lys	Asn	Asn	Ser	Lys	
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Asn	Lys	Asp	Lys	Asn	Val	Val	Ser	Asn	Gly	Leu	Gln	Asp	Thr	Thr	Lys	
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Tyr	Val	Lys	Ile	Leu	Arg	Arg	Gly	Val	Lys	Glu	Ala	Leu	Val	Thr	Glu	
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Ser	Glu	Ala	Lys	Ala	Phe	Asp	Leu	Ala	Ala	Glu	Val	Phe	Gly	Arg	Tyr	
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gta	gac	ttg	aaa	gaa	aaa	tgt	gag	aaa	ttg	act	tcg	gat	tgc	ggg	att	2688
Val	Asp	Leu	Lys	Glu	Lys	Cys	Glu	Lys	Leu	Thr	Ser	Asp	Cys	Gly	Ile	
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Lys	Asp	Asp	Cys	Asp	Gly	Leu	Lys	Glu	Val	Cys	Gly	Lys	Ile	Glu	Lys	
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Thr	Cys	His	Asp	Leu	Lys	Pro	Leu	Glu	Val	Lys	Ser	His	Glu	Ile	Val	
		915					920					925				
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Thr	Glu	Ser	Thr	Thr	Thr	Thr	Thr	Thr	Thr	Thr	Thr	Thr	Val	Thr	Asp	
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Pro	Lys	Ala	Thr	Glu	Cys	Lys	Ser	Leu	Gln	Thr	Thr	Asp	Thr	Trp	Val	
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Thr	Gln	Thr	Ser	Thr	His	Thr	Ser	Thr	Ser	Thr	Ile	Thr	Ser	Thr	Ile	
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Thr	Ser	Lys	Ile	Thr	Leu	Thr	Ser	Thr	Arg	Arg	Cys	Lys	Pro	Thr	Lys	
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tgt acg aca ggg gat gaa gca gga gac gtg aaa ccg agt gag gga ttg 3024
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att tcg ttc atg att tag 3090
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 Cys Asp Asn Gly Lys Arg Asn Glu Lys Cys Gln Asp Leu Lys Asn Lys
 65 70 75 80
 Val Asn Gln Lys Cys Ile Lys Phe Gln Gly Lys Leu Gln Thr Ala Ala
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 Gly Lys Lys Ile Ser Glu Leu Thr Asp Glu Asp Cys Lys Lys Asn Glu
 100 105 110
 Gln Gln Cys Leu Phe Leu Glu Gly Ala Cys Pro Thr Glu Leu Lys Asp
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 Val Ala Glu Glu Val Leu Leu Arg Ala Leu Arg Gly Asp Leu Asn Glu
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 Arg Glu Ser Asp Glu Leu Thr Glu Leu Cys Leu Tyr Gln Lys Thr Thr
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 Cys Val Ser Leu Val Thr Lys Gly Lys Ser Lys Cys Asp Thr Leu Glu
 195 200 205
 Lys Glu Val Glu Glu Ala Leu Lys Lys Asn Glu Leu Arg Glu Lys Cys
 210 215 220

Leu	Leu	Leu	Leu	Glu	Gln	Cys	Tyr	Phe	His	Arg	Gly	Asn	Cys	Glu	Gly	225	230	235	240
Asp	Lys	Ser	Lys	Cys	Asn	Lys	Pro	Asn	Asn	Lys	Asp	Cys	Lys	Glu	Tyr	245	250	255	
Val	Pro	Glu	Cys	Asp	Glu	Leu	Ala	Glu	Lys	Cys	Gly	Lys	Glu	Asn	Ile	260	265	270	
Val	Tyr	Met	His	Pro	Gly	Ser	Asp	Phe	Asp	Pro	Thr	Lys	Pro	Glu	Pro	275	280	285	
Thr	Leu	Ala	Glu	Asp	Ile	Gly	Leu	Glu	Glu	Leu	Tyr	Lys	Arg	Ala	Glu	290	295	300	
Glu	Asp	Gly	Ile	Phe	Val	Gly	Arg	Gln	His	Val	Arg	Asp	Ala	Thr	Ala	305	310	315	320
Leu	Leu	Ala	Leu	Leu	Leu	Lys	Lys	Thr	Leu	Lys	Lys	Glu	Glu	Cys	Ile	325	330	335	
Lys	Ala	Leu	Lys	Lys	Asn	Cys	Glu	Asn	Pro	His	Glu	His	Glu	Ala	Leu	340	345	350	
Glu	Asn	Leu	Cys	Lys	Glu	Asn	Lys	Pro	Ser	Ser	Asp	Gly	Thr	Lys	Lys	355	360	365	
Cys	Asp	Glu	Leu	Glu	Lys	Asp	Val	Asn	Lys	Thr	Cys	Thr	Ser	Leu	Thr	370	375	380	
Ser	Thr	Ile	Leu	Lys	Asn	Arg	Leu	Tyr	Ile	Ser	Pro	Asp	Gly	Ile	Ala	385	390	395	400
Glu	Trp	Gly	Lys	Leu	Pro	Thr	Phe	Leu	Ser	Asp	Glu	Asp	Cys	Ala	Lys	405	410	415	
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Val	Cys	Glu	Lys	Leu	Lys	Gly	Asn	Lys	Gly	Ser	Phe	Ser	Asn	Asp	Glu	485	490	495	
Leu	Phe	Val	Leu	Cys	Ile	Gln	Pro	Ala	Lys	Ala	Ala	Arg	Leu	Leu	Thr	500	505	510	
His	His	His	Gln	Met	Arg	Val	Ile	Phe	Leu	Arg	Gln	Gln	Leu	Asp	Gln	515	520	525	
Lys	Arg	Asp	Phe	Pro	Thr	Asp	Lys	Asp	Cys	Lys	Glu	Leu	Gly	Arg	Lys	530	535	540	

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 Gln Ile Leu Leu Asp Glu His Lys Asp Thr Leu Lys Ser His Glu Asn
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 Cys Ala Lys Tyr Leu Lys Arg Lys Cys His Lys Trp Ser Arg Arg Gly
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 Ala Glu Ser Ala Ala Asn Ile Cys Pro Ser Trp His Pro Tyr Cys Asp
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 Gln Asn Leu Lys Lys Tyr Cys Glu Pro Phe Tyr Lys Arg Lys Val Leu
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 Tyr Val Lys Ile Leu Arg Arg Gly Val Lys Glu Ala Leu Val Thr Glu
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Ser Glu Ala Lys Ala Phe Asp Leu Ala Ala Glu Val Phe Gly Arg Tyr
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 Val Asp Leu Lys Glu Lys Cys Glu Lys Leu Thr Ser Asp Cys Gly Ile
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 Asp Glu Glu His Val Leu Ala Leu Ile Leu Lys Lys Asn Gly Leu Glu
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 Asp Thr Lys Cys Lys Thr Lys Leu Glu Glu Tyr Cys Lys Thr Leu Thr
 35 40 45
 aat gca gga tta aat cca gaa aaa gtt cac gaa aaa tta aaa gat ttc 192
 Asn Ala Gly Leu Asn Pro Glu Lys Val His Glu Lys Leu Lys Asp Phe
 50 55 60

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Cys Asp Asn Gly Lys Arg Asn Glu Lys Cys Gln Asp Leu Lys Asn Lys	
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Val Asn Gln Lys Cys Ile Lys Phe Gln Gly Lys Leu Gln Thr Ala Ala	
85 90 95	
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Arg Lys Lys Ile Ser Glu Leu Thr Asp Glu Asp Cys Lys Lys Asn Glu	
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Gln Gln Cys Leu Phe Leu Glu Gly Ala Cys Pro Thr Glu Leu Lys Asp	
115 120 125	
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Asp Cys Asn Lys Leu Arg Asn Asn Cys Tyr Gln Lys Glu Arg Asn Asn	
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Arg Glu Ser Asp Glu Leu Thr Glu Leu Cys Leu Tyr Gln Lys Thr Thr	
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Cys Val Ser Leu Val Thr Lys Gly Lys Ser Lys Cys Asp Thr Leu Glu	
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Lys Glu Val Glu Glu Ala Leu Lys Lys Asn Glu Leu Arg Glu Lys Cys	
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Asp Lys Ser Lys Cys Asn Lys Pro Asn Asn Lys Asp Cys Lys Glu Tyr	
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Val Tyr Met His Pro Gly Ser Asp Phe Asp Pro Thr Lys Pro Glu Pro	
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Thr Leu Ala Glu Asp Ile Gly Leu Glu Glu Leu Tyr Lys Arg Ala Glu	
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Glu Asp Gly Ile Phe Val Gly Arg Gln His Val Arg Asp Ala Thr Ala	
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Leu Leu Ala Leu Leu Leu Lys Lys Thr Leu Lys Lys Glu Glu Cys Ile	
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Lys Ala Leu Lys Lys Asn Cys Glu Asn Pro His Glu His Glu Ala Leu	
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Ser Thr Ile Leu Lys Asn Arg Leu Tyr Ile Ser Pro Asp Gly Ile Ala	
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Leu Glu Ser Tyr Cys Phe Tyr Tyr Lys Glu Thr Cys Pro Asp Val Lys	
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Ile Phe Val Leu Cys Val Gln Pro Ala Lys Ala Ala Arg Leu Leu Thr	
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His Asp His Gln Met Arg Val Thr Phe Leu Arg Gln Gln Leu Asp Gln	
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Arg Phe Ser Pro Asn Cys Pro Gly Leu Thr Lys Glu Asn Ser Cys Thr	
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Lys Ile Lys Lys His Cys Glu Pro Phe Tyr Lys Arg Lys Ala Leu Glu	
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Asp Ala Leu Lys Val Glu Leu Gln Gly Lys Leu Thr Asp Lys Ser Lys	
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tgt gaa cct gca ttg aac aga tat tgt aca gta gcg gga aac gta aat	2208
Cys Glu Pro Ala Leu Asn Arg Tyr Cys Thr Val Ala Gly Asn Val Asn	
725 730 735	
aat gcg tca atc agt ggc tta tgc aaa gct aac acc aag gat aac tct	2256
Asn Ala Ser Ile Ser Gly Leu Cys Lys Ala Asn Thr Lys Asp Asn Ser	
740 745 750	
gga aag agt gat gag gat gct aga aag gaa ctc tgt gag aaa tca gtg	2304
Gly Lys Ser Asp Glu Asp Ala Arg Lys Glu Leu Cys Glu Lys Ser Val	
755 760 765	
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Lys Glu Val Glu Glu Gln Cys Lys Ala Leu Pro Thr Glu Leu Gly Gln	
770 775 780	

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Pro Ala Ala Asp Leu Lys Lys Asp Tyr Lys Thr Tyr Glu Glu Leu Lys	
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Asp Lys Asn Ala Val Ser Asn Gly Leu Gln Asp Thr Thr Lys His Val	
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Lys Ile Leu Arg Arg Gly Val Lys Asp Val Ser Val Thr Glu Leu Glu	
850 855 860	
gct aaa gca ttt gat ttg gca gca gaa gta ttt gga aga tat gta gat	2640
Ala Lys Ala Phe Asp Leu Ala Ala Glu Val Phe Gly Arg Tyr Val Asp	
865 870 875 880	
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Leu Lys Glu Arg Cys Asn Lys Leu Glu Ser Asp Cys Arg Ile Lys Glu	
885 890 895	
gat tgc aaa gac tta gaa gaa gta tgc aaa aag att aat aag gct tgt	2736
Asp Cys Lys Asp Leu Glu Glu Val Cys Lys Lys Ile Asn Lys Ala Cys	
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cgc aat ctg aag cct ctg gag gtg aag ccg cac gaa aca gtg aca gaa	2784
Arg Asn Leu Lys Pro Leu Glu Val Lys Pro His Glu Thr Val Thr Glu	
915 920 925	
ggt aca acg aca act aca aca aca aca aca acc gtt gcc gat ccg aag	2832
Gly Thr Thr Thr Thr Thr Thr Thr Thr Thr Thr Thr Val Ala Asp Pro Lys	
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Ala Thr Glu Cys Lys Ser Leu Gln Thr Thr Asp Thr Trp Val Thr Gln	
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Thr Ser Thr His Thr Ser Thr Ser Thr Ile Thr Ser Thr Ile Thr Ser	
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Lys Ile Thr Leu Thr Ser Thr Arg Arg Cys Lys Pro Thr Lys Cys Thr	
980 985 990	
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Thr Gly Asp Asp Ala Glu Asp Val Lys Pro Ser Glu Gly Leu Arg Val	
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Ser Gly Trp Asn Val Met Arg Gly Val Ile Val Ala Met Val Ile Ser	
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Phe Met Ile
1025

3084

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35 40 45
Asn Ala Gly Leu Asn Pro Glu Lys Val His Glu Lys Leu Lys Asp Phe
50 55 60
Cys Asp Asn Gly Lys Arg Asn Glu Lys Cys Gln Asp Leu Lys Asn Lys
65 70 75 80
Val Asn Gln Lys Cys Ile Lys Phe Gln Gly Lys Leu Gln Thr Ala Ala
85 90 95
Arg Lys Lys Ile Ser Glu Leu Thr Asp Glu Asp Cys Lys Lys Asn Glu
100 105 110
Gln Gln Cys Leu Phe Leu Glu Gly Ala Cys Pro Thr Glu Leu Lys Asp
115 120 125
Asp Cys Asn Lys Leu Arg Asn Asn Cys Tyr Gln Lys Glu Arg Asn Asn
130 135 140
Val Ala Glu Glu Val Leu Leu Arg Ala Leu Arg Gly Asp Leu Asn Glu
145 150 155 160
Thr Lys Thr Cys Glu Lys Lys Leu Lys Glu Val Cys Pro Lys Leu Glu
165 170 175
Arg Glu Ser Asp Glu Leu Thr Glu Leu Cys Leu Tyr Gln Lys Thr Thr
180 185 190
Cys Val Ser Leu Val Thr Lys Gly Lys Ser Lys Cys Asp Thr Leu Glu
195 200 205
Lys Glu Val Glu Glu Ala Leu Lys Lys Asn Glu Leu Arg Glu Lys Cys
210 215 220
Leu Leu Leu Leu Glu Gln Cys Tyr Phe His Arg Gly Asn Cys Glu Gly
225 230 235 240
Asp Lys Ser Lys Cys Asn Lys Pro Asn Asn Lys Asp Cys Lys Glu Tyr
245 250 255
Val Pro Glu Cys Asp Glu Leu Ala Glu Lys Cys Gly Lys Glu Asn Ile
260 265 270

Val	Tyr	Met	His	Pro	Gly	Ser	Asp	Phe	Asp	Pro	Thr	Lys	Pro	Glu	Pro	275	280	285
Thr	Leu	Ala	Glu	Asp	Ile	Gly	Leu	Glu	Glu	Leu	Tyr	Lys	Arg	Ala	Glu	290	295	300
Glu	Asp	Gly	Ile	Phe	Val	Gly	Arg	Gln	His	Val	Arg	Asp	Ala	Thr	Ala	305	310	315
Leu	Leu	Ala	Leu	Leu	Leu	Lys	Lys	Thr	Leu	Lys	Lys	Glu	Glu	Cys	Ile	325	330	335
Lys	Ala	Leu	Lys	Lys	Asn	Cys	Glu	Asn	Pro	His	Glu	His	Glu	Ala	Leu	340	345	350
Glu	Asn	Leu	Cys	Lys	Glu	Asn	Lys	Pro	Ser	Ser	Asp	Gly	Thr	Lys	Lys	355	360	365
Cys	Asp	Glu	Leu	Glu	Lys	Asp	Val	Asn	Lys	Thr	Cys	Thr	Ser	Leu	Thr	370	375	380
Ser	Thr	Ile	Leu	Lys	Asn	Arg	Leu	Tyr	Ile	Ser	Pro	Asp	Gly	Ile	Ala	385	390	395
Glu	Trp	Gly	Lys	Leu	Pro	Thr	Phe	Leu	Ser	Asp	Glu	Asp	Cys	Ala	Lys	405	410	415
Leu	Glu	Ser	Tyr	Cys	Phe	Tyr	Tyr	Lys	Glu	Thr	Cys	Pro	Asp	Val	Lys	420	425	430
Glu	Ala	Cys	Met	Asn	Val	Arg	Ala	Ala	Cys	Tyr	Lys	Arg	Gly	Leu	Asp	435	440	445
Ala	Arg	Ala	Asn	Ser	Val	Leu	Gln	Lys	Asn	Met	Arg	Gly	Leu	Leu	Arg	450	455	460
Gly	Ser	Asn	Gln	Ser	Trp	Leu	Lys	Glu	Phe	Gln	Gln	Arg	Leu	Val	Lys	465	470	475
Val	Cys	Lys	Glu	Leu	Lys	Glu	Asn	Lys	Gly	Ser	Phe	Pro	Asn	Asp	Glu	485	490	495
Ile	Phe	Val	Leu	Cys	Val	Gln	Pro	Ala	Lys	Ala	Ala	Arg	Leu	Leu	Thr	500	505	510
His	Asp	His	Gln	Met	Arg	Val	Thr	Phe	Leu	Arg	Gln	Gln	Leu	Asp	Gln	515	520	525
Lys	Arg	Asp	Phe	Pro	Thr	Asp	Lys	Asp	Cys	Lys	Glu	Leu	Gly	Lys	Lys	530	535	540
Cys	Gln	Asp	Leu	Gly	Lys	Asp	Ser	Lys	Glu	Ile	Thr	Trp	Pro	Cys	His	545	550	555
Thr	Leu	Glu	Gln	Gln	Cys	Asn	Arg	Leu	Gly	Thr	Thr	Glu	Ile	Leu	Lys	565	570	575
Gln	Val	Leu	Leu	Asp	Glu	His	Lys	Asp	Thr	Leu	Lys	Asp	Gln	Glu	Ser	580	585	590

Cys	Val	Lys	Tyr	Leu	Lys	Glu	Lys	Cys	Asn	Lys	Trp	Ser	Arg	Arg	Gly			
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Ile	Thr	Thr	Leu	Glu	Arg	Asn	Cys	Pro	Ser	Trp	His	Thr	Tyr	Cys	Asn			
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Arg	Phe	Ser	Pro	Asn	Cys	Pro	Gly	Leu	Thr	Lys	Glu	Asn	Ser	Cys	Thr			
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Lys	Ile	Lys	Lys	His	Cys	Glu	Pro	Phe	Tyr	Lys	Arg	Lys	Ala	Leu	Glu			
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Cys	Glu	Pro	Ala	Leu	Asn	Arg	Tyr	Cys	Thr	Val	Ala	Gly	Asn	Val	Asn			
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Gly	Lys	Ser	Asp	Glu	Asp	Ala	Arg	Lys	Glu	Leu	Cys	Glu	Lys	Ser	Val			
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Lys	Glu	Val	Glu	Glu	Gln	Cys	Lys	Ala	Leu	Pro	Thr	Glu	Leu	Gly	Gln			
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Pro	Ala	Ala	Asp	Leu	Lys	Lys	Asp	Tyr	Lys	Thr	Tyr	Glu	Glu	Leu	Lys			
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Arg Asn Leu Lys Pro Leu Glu Val Lys Pro His Glu Thr Val Thr Glu
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 Lys Ile Thr Leu Thr Ser Thr Arg Arg Cys Lys Pro Thr Lys Cys Thr
 980 985 990
 Thr Gly Asp Asp Ala Glu Asp Val Lys Pro Ser Glu Gly Leu Arg Val
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 Val Tyr Asp Gly Glu Glu Ile Leu Leu Ala Leu Ile Ala Gly Lys Lys
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 tat aat gat aat gaa tgc aaa aaa gaa tta gaa aaa tat tgt aag aca 144
 Tyr Asn Asp Asn Glu Cys Lys Lys Glu Leu Glu Lys Tyr Cys Lys Thr
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 Leu Thr Asp Ala Glu Leu Lys Pro Glu Lys Val His Lys Lys Leu Lys
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 gag ttt tgt gaa aat aaa aaa gca gat tca aaa tgc aaa gaa ctg aaa 240
 Glu Phe Cys Glu Asn Lys Lys Ala Asp Ser Lys Cys Lys Glu Leu Lys
 65 70 75 80
 gaa aaa ctc act caa aaa tgt act gca atc aaa gga aaa ctt aca gaa 288
 Glu Lys Leu Thr Gln Lys Cys Thr Ala Ile Lys Gly Lys Leu Thr Glu
 85 90 95

gca atc aaa aaa aaa aat tca gat tta acg gat gaa gat tgc aaa gag	336
Ala Ile Lys Lys Lys Asn Ser Asp Leu Thr Asp Glu Asp Cys Lys Glu	
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Asn Glu Gln Gln Cys Leu Phe Leu Glu Gly Ala Cys Pro Ala Glu Leu	
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Lys Asp Asp Cys Asn Thr Leu Arg Asn Lys Cys Tyr Gln Lys Lys Arg	
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gat aaa gtg gcg gaa gaa gct ctt tta aga gca gtt cgt gga ggt cta	480
Asp Lys Val Ala Glu Glu Ala Leu Leu Arg Ala Val Arg Gly Gly Leu	
145 150 155 160	
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Ile Asn Glu Thr Thr Cys Glu Gly Lys Leu Lys Glu Val Cys Ile Glu	
165 170 175	
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Leu Ser Gln Glu Ser Asp Glu Leu Thr Lys Leu Cys Leu Tyr Gln Lys	
180 185 190	
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Met Thr Cys Lys Thr Phe Val Leu Glu Lys Gln Lys Lys Cys Asn Ala	
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210 215 220	
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Cys Glu Asp Ile Ser Lys Cys Asn Lys Ser Ser Glu Asp Cys Tyr Glu	
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Tyr Leu Pro Val Cys Asp Thr Leu Ala Val Lys Cys Glu Glu Asn Lys	
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Ile Ile Tyr Thr His Pro Gly Ser Asp Phe Asn Pro Thr Lys Ser Lys	
275 280 285	
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Pro Thr Val Ala Glu Asp Ile Gly Leu Glu Glu Leu Tyr Lys Lys Ala	
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Ala Glu Glu Gly Val His Ile Gly Lys Pro Pro Val Arg Asp Ala Thr	
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325 330 335	

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Gly Lys Glu Cys Glu Lys Val Leu Lys Asp Asn Cys Lys Glu Leu Lys	
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Ala Leu Gly Lys Asp Ser Asn Gln Ile Lys Trp Pro Cys His Thr Leu	
545 550 555 560	
aaa caa cag tgt gat cgc ttg ggg act aca gaa atc ttg aaa cag gtt	1728
Lys Gln Gln Cys Asp Arg Leu Gly Thr Thr Glu Ile Leu Lys Gln Val	
565 570 575	

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Leu Leu Asp Glu His Lys Asp Thr Leu Arg Thr His Glu Asn Cys Thr	
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Arg Phe Ser Phe Val Cys Val Tyr Gln Asn Ala Thr Cys Lys Leu Ile	
610 615 620	
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Val Asp Asp Val Lys Asp Arg Cys Glu Val Phe Glu Lys Asn Met Gln	
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Ala Ser Asp Ile Asn Asn Ser Leu Lys Asn Lys Gln Ile Lys Thr Glu	
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Ser Ala Ala Asn Ile Cys Pro Ser Trp His Pro Tyr Cys Asp Arg Phe	
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Leu Pro Asn Cys Pro Asp Leu Lys Lys Gly Lys Thr Phe Cys Gln Asn	
675 680 685	
ctt aaa aaa tat tgc gaa cca ttc tac aaa agg aag gtt tta gaa gat	2112
Leu Lys Lys Tyr Cys Glu Pro Phe Tyr Lys Arg Lys Val Leu Glu Asp	
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Ser Ser Ile Asn Ser Leu Cys Lys Asp Asn Thr Glu Ser Lys Thr Lys	
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aag acc gat aat gaa gtt aga aag aag ctt tgt cta aaa tta gtg gaa	2304
Lys Thr Asp Asn Glu Val Arg Lys Lys Leu Cys Leu Lys Leu Val Glu	
755 760 765	
gag gtg gaa cag caa tgt aaa atg tta cca gca gaa ttg gag cat gag	2352
Glu Val Glu Gln Gln Cys Lys Met Leu Pro Ala Glu Leu Glu His Glu	
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gaa aaa gac cta aaa gat gat ttt gaa aca ttt gaa aaa ctt aaa aaa	2400
Glu Lys Asp Leu Lys Asp Asp Phe Glu Thr Phe Glu Lys Leu Lys Lys	
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cag gca gag aaa aca atg aat aaa tcc aat ctt gtt tta tca ttc gtt	2448
Gln Ala Glu Lys Thr Met Asn Lys Ser Asn Leu Val Leu Ser Phe Val	
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Ile	Leu	Arg	Arg	Gly	Val	Lys	Asp	Val	Ser	Val	Thr	Glu	Ser	Glu	Ala	
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Lys	Ala	Phe	Asp	Leu	Val	Ala	Glu	Val	Phe	Gly	Arg	Tyr	Leu	Asp	Leu	
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Lys	Glu	Arg	Cys	Asn	Lys	Leu	Glu	Ser	Asp	Cys	Arg	Val	Lys	Glu	Asp	
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tgc	aag	gat	tta	gaa	gga	gta	tgt	gga	aag	ata	caa	gga	gta	tgt	tcg	2736
Cys	Lys	Asp	Leu	Glu	Gly	Val	Cys	Gly	Lys	Ile	Gln	Gly	Val	Cys	Ser	
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Lys	Leu	Lys	Pro	Leu	Lys	Val	Lys	Pro	His	Glu	Thr	Val	Thr	Glu	Ser	
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Thr	Thr	Thr	Thr	Thr	Thr	Thr	Thr	Thr	Thr	Val	Thr	Asp	Pro	Lys	Ala	
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aca	gaa	tgc	aaa	tct	tta	cag	aca	aca	gat	aca	tgg	att	aca	cag	act	2880
Thr	Glu	Cys	Lys	Ser	Leu	Gln	Thr	Thr	Asp	Thr	Trp	Ile	Thr	Gln	Thr	
945					950					955					960	
tcg	aca	cat	acc	agc	acg	tct	acc	atc	aca	tct	aca	atc	aca	tca	aaa	2928
Ser	Thr	His	Thr	Ser	Thr	Ser	Thr	Ile	Thr	Ser	Thr	Ile	Thr	Ser	Lys	
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ata	aca	ctc	aca	tca	aca	agg	cgt	tgc	aaa	cca	acc	aag	tgt	acg	aca	2976
Ile	Thr	Leu	Thr	Ser	Thr	Arg	Arg	Cys	Lys	Pro	Thr	Lys	Cys	Thr	Thr	
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Gly	Asp	Asp	Ala	Glu	Asp	Val	Lys	Pro	Ser	Glu	Gly	Leu	Lys	Met	Ser	
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Glu Phe Cys Glu Asn Lys Lys Ala Asp Ser Lys Cys Lys Glu Leu Lys
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Glu Lys Leu Thr Gln Lys Cys Thr Ala Ile Lys Gly Lys Leu Thr Glu
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Ala Ile Lys Lys Lys Asn Ser Asp Leu Thr Asp Glu Asp Cys Lys Glu
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Asn Glu Gln Gln Cys Leu Phe Leu Glu Gly Ala Cys Pro Ala Glu Leu
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Lys Asp Asp Cys Asn Thr Leu Arg Asn Lys Cys Tyr Gln Lys Lys Arg
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Asp Lys Val Ala Glu Glu Ala Leu Leu Arg Ala Val Arg Gly Gly Leu
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Ile Asn Glu Thr Thr Cys Glu Gly Lys Leu Lys Glu Val Cys Ile Glu
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Met Thr Cys Lys Thr Phe Val Leu Glu Lys Gln Lys Lys Cys Asn Ala
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Gly Lys Cys Leu Pro Leu Leu Glu Arg Cys Tyr Phe Tyr Arg Gly Asn
225 230 235 240
Cys Glu Asp Ile Ser Lys Cys Asn Lys Ser Ser Glu Asp Cys Tyr Glu
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Tyr Leu Pro Val Cys Asp Thr Leu Ala Val Lys Cys Glu Glu Asn Lys
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Ile Ile Tyr Thr His Pro Gly Ser Asp Phe Asn Pro Thr Lys Ser Lys
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Gly Lys Glu Cys Glu Lys Val Leu Lys Asp Asn Cys Lys Glu Leu Lys
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 Gly Glu Val Ile Pro Trp Tyr Lys Leu Thr Thr Phe Leu Ser Asp Asn
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 Asp Cys Thr Arg Leu Glu Ser Asp Cys Phe Tyr Leu Lys Ser Gln Ala
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 Ser Ser Ile Asn Ser Leu Cys Lys Asp Asn Thr Glu Ser Lys Thr Lys
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 Ile Leu Arg Arg Gly Val Lys Asp Val Ser Val Thr Glu Ser Glu Ala
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 885 890 895
 Cys Lys Asp Leu Glu Gly Val Cys Gly Lys Ile Gln Gly Val Cys Ser
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 945 950 955 960
 Ser Thr His Thr Ser Thr Ser Thr Ile Thr Ser Thr Ile Thr Ser Lys
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Asp	Glu	Val	Asn	Ile	Leu	Ala	Leu	Ile	Leu	Gln	Glu	Asp	Ala	Met	Glu	
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gat	aca	aaa	tgc	aaa	aaa	agt	tta	gaa	aaa	tac	tgc	gaa	gag	ttg	aaa	144
Asp	Thr	Lys	Cys	Lys	Lys	Ser	Leu	Glu	Lys	Tyr	Cys	Glu	Glu	Leu	Lys	
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Lys	Ala	Ser	Leu	Asp	Met	Glu	Lys	Val	His	Lys	Met	Leu	Lys	Asp	Phe	
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Cys	Gly	Asn	Gly	Lys	Ala	Ser	Lys	Ala	Asn	Thr	Lys	Cys	Gln	Gly	Leu	
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caa	gcc	aaa	gtt	acg	ggg	aaa	tgt	aca	aat	ttt	aaa	aca	caa	aag	cta	288
Gln	Ala	Lys	Val	Thr	Gly	Lys	Cys	Thr	Asn	Phe	Lys	Thr	Gln	Lys	Leu	
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gga	cca	gcg	tta	aca	aat	cca	tca	gat	gat	aat	tgc	aaa	gag	agt	gaa	336
Gly	Pro	Ala	Leu	Thr	Asn	Pro	Ser	Asp	Asp	Asn	Cys	Lys	Glu	Ser	Glu	
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Arg	Gln	Cys	Leu	Phe	Leu	Glu	Gly	Ala	Cys	His	Asn	Leu	Val	Glu	Asp	
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Cys	Asn	Lys	Leu	Arg	Asn	Leu	Cys	Tyr	Gln	Lys	Lys	Arg	Asp	Gly	Val	
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Glu Ser Asn Glu Leu Thr Asp Leu Cys Leu Asn Gln Lys Lys Thr Cys	
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Glu Asn Ile Ile Lys Glu Lys Asp Lys Lys Cys Thr Thr Leu Lys Ala	
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Asn Val Ala Thr Ala Leu Gly Ser Phe Lys Lys Glu Ile Cys Leu Glu	
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Ile Ile Lys Cys Ile Glu Leu Gly Gly Lys Cys Gln Glu Gln Asn Ile	
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Val Tyr Ile Pro Pro Gly Pro Asp Phe Asp Pro Thr Arg Pro Glu Ala	
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aca cta gca gag gac ata gac ctg gat gag ctt tat aaa aag gca gaa	864
Thr Leu Ala Glu Asp Ile Asp Leu Asp Glu Leu Tyr Lys Lys Ala Glu	
275 280 285	
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Glu Asp Gly Val Phe Ile Gly Lys His His Leu Arg Asp Ala Thr Ala	
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Leu Leu Thr Leu Leu Val Lys Lys Asp Asp Thr Gly Lys Asn Asn Asn	
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atc gga gaa aaa tgc aat aag att ctc gaa gat aaa tgc aaa aac tct	1008
Ile Gly Glu Lys Cys Asn Lys Ile Leu Glu Asp Lys Cys Lys Asn Ser	
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Gln Gln His Glu Ala Leu Lys Asn Leu Cys Asn Asn Asn Ser Pro Asn	
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Thr Cys Thr Asn Leu Lys Pro Thr Ile Leu Lys Asn His Leu Tyr Asp	
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Asn Glu Asp Cys Ala Arg Leu Glu Ser Tyr Cys Phe Tyr Tyr Glu Lys	
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Ala Cys Pro Asn Ala Lys Glu Glu Cys Met Asn Leu Arg Ala Ala Cys	
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Tyr Lys Arg Gly Leu Asp Gly Arg Ala Asn Lys Val Leu Gln Glu Asn	
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Ser Phe Pro Asn Asp Glu Ile Phe Val Leu Cys Val Gln Pro Ala Lys	
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Trp His Thr Tyr Cys Asn Arg Phe Ser Pro Asn Cys Pro Gly Leu Thr	
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Lys Arg Lys Lys Ala Leu Glu Asp Ala Leu Lys Val Glu Leu Gln Gly Lys	
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Asn Thr Lys Asp Asn Ser Gly Lys Ser Asp Glu Asp Ala Arg Lys Glu	
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Ser Val Thr Glu Leu Glu Ala Lys Ala Phe Asp Leu Ala Ala Glu Val	
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Phe Gly Arg Tyr Val Asp Leu Lys Glu Arg Cys Asn Lys Leu Glu Ser	
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Lys Ile Asn Lys Ala Cys Arg Asn Leu Lys Pro Leu Glu Val Lys Pro	
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 Cys Asn Lys Leu Arg Asn Leu Cys Tyr Gln Lys Lys Arg Asp Gly Val
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 Glu Asp Gly Val Phe Ile Gly Lys His His Leu Arg Asp Ala Thr Ala
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 Ile Gly Glu Lys Cys Asn Lys Ile Leu Glu Asp Lys Cys Lys Asn Ser
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 Trp His Thr Tyr Cys Asn Arg Phe Ser Pro Asn Cys Pro Gly Leu Thr
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 Asp Cys Arg Ile Lys Glu Asp Cys Lys Asp Leu Glu Glu Val Cys Lys
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Asp Glu Glu His Val Leu Ala Leu Ile Leu Lys Glu Asp Gly Leu Ser	
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Glu Gln Glu Cys Lys Lys Lys Leu Lys Lys Tyr Cys Gln Glu Leu Thr	
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Glu Ala Lys Leu Asn Ile Glu Gln Val His Arg Lys Leu Lys Gly Phe	
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Cys Glu Asp Gly Lys Ala Asp Thr Lys Cys Lys Glu Leu Lys Ala Asn	
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Ile Glu Lys Lys Cys Thr Thr Ile Lys Gly Lys Leu Lys Glu Ala Ile	
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Lys Lys Lys Ile Gln Ile Ile Thr Asp Lys Asp Cys Lys Glu Asn Glu	
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caa caa tgc cta ttt ttg gag gga gta tgt tca aaa gaa ctt aaa gat	384
Gln Gln Cys Leu Phe Leu Glu Gly Val Cys Ser Lys Glu Leu Lys Asp	
115 120 125	
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Asp Cys Asn Thr Leu Arg Asn Lys Cys Tyr Gln Lys Lys Arg Asp Lys	
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Val Ala Glu Glu Val Leu Leu Arg Ala Leu Arg Ser Asp Leu Asn Gly	
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Ser Val Ile Cys Glu Lys Lys Leu Lys Glu Ile Cys Pro Val Met Gly	
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Arg Glu Ser Asp Glu Leu Thr Asn Leu Cys Leu Asn Gln Lys Glu Thr	
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Cys Lys Asn Ile Leu Ile Glu Lys Asp Lys Lys Cys Gly Thr Leu Lys	
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Thr Asp Val Ser Ala Ala Leu Gly Ser Phe Lys Lys Glu Thr Cys Leu	
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Asp Ile Ile Lys Cys Ile Glu Leu Gly Gly Lys Cys Gln Glu Gln Asn	
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Ile Ala Tyr Met Pro Pro Gly Pro Asp Phe Asp Pro Thr Arg Pro Glu	
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Ala Thr Ile Ala Glu Asp Ile Gly Leu Glu Glu Phe Tyr Lys Lys Val	
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Glu Glu Asp Gly Val Phe Ile Gly Lys Asn His Leu Arg Asp Ala Thr	
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Ala Leu Leu Ala Leu Leu Ile Gln Asp Ser Ser Leu Lys Lys Lys Asp	
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Asp Lys Glu Lys Cys Glu Glu Ala Leu Gln Lys Ser Cys Lys Asn Pro	
325 330 335	
cat gaa cat gag gct tta gaa agt tta tgt aag aaa aat ggt tta agt	1056
His Glu His Glu Ala Leu Glu Ser Leu Cys Lys Lys Asn Gly Leu Ser	
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Asn Asp Gly Thr Lys Lys Cys Glu Glu Leu Gln Asn Asp Ile Asn Lys	
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Thr Cys Lys Ile Phe Thr Ser Lys Val Thr Asn Asn Arg Leu Phe Asp	
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Pro Thr Lys Gly Asn Asn Glu Ile Val Gly Trp Glu Gly Leu Pro Thr	
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Phe Leu Ser Asn Glu Asp Cys Ala Lys Leu Glu Ser Tyr Cys Phe Tyr	
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Phe Glu Lys Lys Cys Pro Asp Gly Glu Asn Ala Cys Lys Asn Ile Arg	
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Ala Thr Cys Tyr Lys Arg Gly Leu Asp Ala Arg Ala Asn Lys Val Leu	
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Gln Glu Asn Met Arg Gly Met Leu His Gly Ser Asn Lys Ser Trp Leu	
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Glu Asn Lys Gly Ser Phe Ser Asn Asp Glu Leu Phe Ile Leu Cys Val	
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cag cca gca aaa gca gcc cgg ttg ctt aca cat gat ctt cga atg aaa	1536
Gln Pro Ala Lys Ala Ala Arg Leu Leu Thr His Asp Leu Arg Met Lys	
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Thr Ile Phe Leu Arg Gln Gln Leu Asp Gln Lys Arg Asp Phe Pro Thr	
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Asp Lys Asn Cys Lys Glu Leu Gly Arg Lys Cys Gln Asp Leu Gly Glu	
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His Lys Asp Thr Leu Lys Asp Gln Glu Ser Cys Val Lys Tyr Leu Lys	
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Lys Asp Arg Cys Glu Val Phe Lys Lys Asn Ile Lys Ala Ser Tyr Ile	
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Ile Glu Phe Leu Glu Asn Asn Thr Asn Lys Ile Thr Thr Leu Glu Arg	
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Pro Gly Leu Thr Lys Glu Asn Ser Cys Thr Lys Ile Lys Lys His Arg	
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gag ccg ttc tat aaa aga aag gcc ttg gaa gat gct ctc aaa gta gag	2112
Glu Pro Phe Tyr Lys Arg Lys Ala Leu Glu Asp Ala Leu Lys Val Glu	
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Arg	Tyr	Cys	Thr	Val	Ala	Gly	Asn	Val	Asn	Asn	Ala	Ser	Ile	Ser	Gly	
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Leu	Cys	Lys	Ala	Asn	Thr	Lys	Asp	Asn	Ser	Gly	Lys	Ser	Asp	Glu	Asp	
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gct	aga	aag	gaa	ctc	tgt	gag	aaa	tta	gtg	aaa	gaa	gtg	gaa	gaa	cag	2304
Ala	Arg	Lys	Glu	Leu	Cys	Glu	Lys	Leu	Val	Lys	Glu	Val	Glu	Glu	Gln	
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Cys	Lys	Ala	Leu	Pro	Thr	Glu	Leu	Gly	Gln	Pro	Ala	Ala	Asp	Leu	Lys	
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Lys	Asp	Tyr	Lys	Thr	Tyr	Glu	Glu	Leu	Lys	Lys	Arg	Ala	Glu	Glu	Ala	
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Met	Asn	Lys	Ser	Ser	Leu	Val	Leu	Ser	Leu	Ile	Lys	Lys	Asn	Glu	Ser	
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Asn	Val	Ser	Lys	Ser	Asn	Ser	Lys	Asn	Lys	Asp	Lys	Asn	Ala	Val	Ser	
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Asn	Gly	Leu	Gln	Asp	Thr	Thr	Lys	His	Val	Lys	Ile	Leu	Arg	Arg	Gly	
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Val	Lys	Asp	Val	Ser	Val	Thr	Glu	Leu	Glu	Ala	Lys	Ala	Phe	Asp	Leu	
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gca	gca	gaa	gta	ttt	gga	aga	tat	gta	gat	ttg	aag	gaa	aga	tgt	aat	2640
Ala	Ala	Glu	Val	Phe	Gly	Arg	Tyr	Val	Asp	Leu	Lys	Glu	Arg	Cys	Asn	
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aaa	ttg	gaa	tca	gat	tgc	aga	att	aag	gag	gat	tgc	aaa	gac	tta	gaa	2688
Lys	Leu	Glu	Ser	Asp	Cys	Arg	Ile	Lys	Glu	Asp	Cys	Lys	Asp	Leu	Glu	
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gaa	gta	tgc	aaa	aag	att	aat	aag	gct	tgt	cgc	aat	ctg	aag	cct	ctg	2736
Glu	Val	Cys	Lys	Lys	Ile	Asn	Lys	Ala	Cys	Arg	Asn	Leu	Lys	Pro	Leu	
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gag	gtg	aag	ccg	cac	gaa	aca	gtg	aca	gaa	agt	aca	acg	aca	act	aca	2784
Glu	Val	Lys	Pro	His	Glu	Thr	Val	Thr	Glu	Ser	Thr	Thr	Thr	Thr	Thr	
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tta	cag	aca	aca	gac	aca	tgg	gtt	aca	cag	aca	tcg	aca	cac	aca	agc	2880
Leu	Gln	Thr	Thr	Asp	Thr	Trp	Val	Thr	Gln	Thr	Ser	Thr	His	Thr	Ser	
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acg	agg	cga	tgc	aaa	cca	acc	aag	tgt	acg	aca	gga	gag	gaa	gat	gat	2976
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Ala	Gly	Asp	Val	Lys	Pro	Ser	Glu	Gly	Leu	Arg	Met	Ser	Gly	Trp	Asn	
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Cys	Glu	Asp	Gly	Lys	Ala	Asp	Thr	Lys	Cys	Lys	Glu	Leu	Lys	Ala	Asn	
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Ile	Glu	Lys	Lys	Cys	Thr	Thr	Ile	Lys	Gly	Lys	Leu	Lys	Glu	Ala	Ile	
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Lys	Lys	Lys	Ile	Gln	Ile	Ile	Thr	Asp	Lys	Asp	Cys	Lys	Glu	Asn	Glu	
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Gln	Gln	Cys	Leu	Phe	Leu	Glu	Gly	Val	Cys	Ser	Lys	Glu	Leu	Lys	Asp	
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Ser	Val	Ile	Cys	Glu	Lys	Lys	Leu	Lys	Glu	Ile	Cys	Pro	Val	Met	Gly	
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 Thr Arg Arg Cys Lys Pro Thr Lys Cys Thr Thr Gly Glu Glu Asp Asp
 980 985 990
 Ala Gly Asp Val Lys Pro Ser Glu Gly Leu Arg Met Ser Gly Trp Asn
 995 1000 1005
 Val Met Arg Gly Val Ile Val Ala Met Val Ile Ser Phe Met Ile
 1010 1015 1020

<210> 15
 <211> 249
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 <213> *Pneumocystis carinii* sp. f. *hominis*

<220>
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<400> 15
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 Glu Cys Gln Ser Leu Gln Thr Thr Asp Thr Trp Val Thr Lys Thr Ser
 1 5 10 15
 acc cat act agc act tct acg act acg tcc aca gtc aca tcg aga ata 96
 Thr His Thr Ser Thr Ser Thr Thr Thr Ser Thr Val Thr Ser Arg Ile
 20 25 30
 aca ctc acc tca acg agg cgg tgt aag cct acg aag tgt acg aca gga 144
 Thr Leu Thr Ser Thr Arg Arg Cys Lys Pro Thr Lys Cys Thr Thr Gly
 35 40 45

gag gaa gat gat gca gga gag gtg aag ccg agt gaa ggg ctg agg atg 192
 Glu Glu Asp Asp Ala Gly Glu Val Lys Pro Ser Glu Gly Leu Arg Met
 50 55 60

agt ggg tgg agt gtg atg agg ggg gtg tta tta gca atg atg att tca 240
 Ser Gly Trp Ser Val Met Arg Gly Val Leu Leu Ala Met Met Ile Ser
 65 70 75 80

ttc atg att 249
 Phe Met Ile

<210> 16
 <211> 83
 <212> PRT
 <213> *Pneumocystis carinii* sp. f. *hominis*

<400> 16
 Glu Cys Gln Ser Leu Gln Thr Thr Asp Thr Trp Val Thr Lys Thr Ser
 1 5 10 15
 Thr His Thr Ser Thr Ser Thr Thr Thr Ser Thr Val Thr Ser Arg Ile
 20 25 30
 Thr Leu Thr Ser Thr Arg Arg Cys Lys Pro Thr Lys Cys Thr Thr Gly
 35 40 45
 Glu Glu Asp Asp Ala Gly Glu Val Lys Pro Ser Glu Gly Leu Arg Met
 50 55 60
 Ser Gly Trp Ser Val Met Arg Gly Val Leu Leu Ala Met Met Ile Ser
 65 70 75 80
 Phe Met Ile

<210> 17
 <211> 25
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: synthetic
 oligonucleotide

<400> 17
 gaatgcaaat ccttacagac aacag 25

<210> 18
 <211> 25
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: synthetic
 oligonucleotide

<p><400> 18 gaatgcaaatt ctttacagac aacag</p>	25
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<p><400> 19 tgcaaaccac ccaagtgtac gacagg</p>	26
<p><210> 20 <211> 25 <212> DNA <213> Artificial Sequence</p>	
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<p><400> 20 aaatcatgaa cgaaataacc attgc</p>	25
<p><210> 21 <211> 30 <212> DNA <213> Artificial Sequence</p>	
<p><220> <223> Description of Artificial Sequence: synthetic oligonucleotide</p>	
<p><400> 21 tttcatatgg cgcgggacgt caagcggcag</p>	30
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<220>
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 oligonucleotide

 <400> 23
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 <210> 24
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 <212> DNA
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 <220>
 <223> Description of Artificial Sequence: synthetic
 oligonucleotide

 <400> 24
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 <210> 25
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 1 5 10 15

 Leu Leu Glu Lys Ile Met
 20

 <210> 26
 <211> 15
 <212> PRT
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 <220>
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 peptide

 <400> 26
 Thr Ile Thr Ser Thr Ile Thr Ser Lys Ile Thr Leu Thr Ser Thr
 1 5 10 15

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 13